

WHAT IS CLAIMED IS:

- 1 1. A method for registration of first and second images out of
2 registration, the method comprising the steps of:
3 (a) making the edges in the first and second images more prominent;
4 (b) thresholding the first and second images from the previous step
5 using a threshold for which N percent of the pixels of each of the first and second
6 images are over the threshold;
7 (c) reducing the resolution of the first and second images from the
8 previous step; and
9 (d) registering the first and second images of reduced resolution from
10 the previous step.
- 1 2. The method of claim 1, further comprising the step of blurring the
2 first and second images from the thresholding step.
- 1 3. The method of claim 2, wherein the blurring step comprises filtering
2 each of the first and second images from the thresholding step such that each pixel
3 therein is thickened by a predetermined number of pixels in a square array that extends
4 the predetermined number of pixels in all four directions from a central pixel.
- 1 4. The method of claim 1, further comprising the step of increasing the
2 resolution of the registered first and second images from the registering step.
- 1 5. The method of claim 1, wherein step (a) comprises filtering the first
2 and second images with an edge-enhancement filter.
- 1 6. The method of claim 1, wherein N, the percentage of pixels of each
2 of the first and second images which are over the threshold is in the range of 70-80
3 percent.

1 7. The method of claim 6, wherein N, the percentage of pixels of each
2 of the first and second images which are over the threshold is 80 percent.

1 8. The method of claim 1, wherein step (b) further comprises choosing
2 N automatically by computing a histogram of pixel intensities and setting the
3 threshold for which N percent are over the threshold for a predetermined value of N.

1 9. The method of claim 1, wherein step (c) comprises reducing the
2 resolution of each of the first and second images from the previous step by a factor
3 used to partition each of the first and second images from the previous step into square
4 blocks of pixels and replacing each square with the sum of the pixel values.

1 10. The method of claim 1, wherein step (d) comprises using a
2 normalized correlation as a criteria for registering the first and second images from the
3 previous step.

1 11. The method of claim 1, wherein the registering of step (d) is done
2 using a Fourier technique.

1 12. A program storage device readable by machine, tangibly
2 embodying a program of instructions executable by machine to perform method steps
3 for registration of first and second images out of registration, the method comprising
4 the steps of:

5 (a) making the edges in the first and second images more prominent;

6 (b) thresholding the first and second images from the previous step
7 using a threshold for which N percent of the pixels of each of the first and second
8 images are over the threshold;

9 (c) reducing the resolution of the first and second images from the
10 previous step; and
11 (d) registering the first and second images of reduced resolution from
12 the previous step.

1 13. The program storage device of claim 12, further comprising the
2 step of blurring the first and second images from the thresholding step.

1 14. The program storage device of claim 13, wherein the blurring step
2 comprises filtering each of the first and second images from the thresholding step such
3 that each pixel therein is thickened by a predetermined number of pixels in a square
4 array that extends the predetermined number of pixels in all four directions from a
5 central pixel.

1 15. The program storage device of claim 12, further comprising the
2 step of increasing the resolution of the registered first and second images from the
3 registering step.

1 16. The program storage device of claim 12, wherein step (a)
2 comprises filtering the first and second images with an edge-enhancement filter.

1 17. The program storage device of claim 12, wherein N, the percentage
2 of pixels of each of the first and second images which are over the threshold is in the
3 range of 70-80 percent.

1 18. The program storage device of claim 17, wherein N, the percentage
2 of pixels of each of the first and second images which are over the threshold is 80
3 percent.

1 19. The program storage device of claim 12, wherein step (b) further
2 comprises choosing N automatically by computing a histogram of pixel intensities and
3 setting the threshold for which N percent are over the threshold for a predetermined
4 value of N.

1 20. The program storage device of claim 12, wherein step (c)
2 comprises reducing the resolution of each of the first and second images from the
3 previous step by a factor used to partition each of the first and second images from the
4 previous step into square blocks of pixels and replacing each square with the sum of
5 the pixel values.

1 21. The program storage device of claim 12, wherein step (d)
2 comprises using a normalized correlation as a criteria for registering the first and
3 second images from the previous step.

1 22. The program storage device of claim 12, wherein the registering of
2 step (d) is done using a Fourier technique.

1 23. A computer program product embodied in a computer-readable
2 medium for implementing registration of first and second images out of registration,
3 the computer program product comprising:

4 (a) computer readable code means for making the edges in the first and
5 second images more prominent;

6 (b) computer readable code means for thresholding the first and second
7 images from the previous step using a threshold for which N percent of the pixels of
8 each of the first and second images are over the threshold;

9 (c) computer readable code means for reducing the resolution of the
10 first and second images from the previous step; and

11 (d) computer readable code means for registering the first and second
12 images of reduced resolution from the previous step.

1 24. The computer program product of claim 23, further comprising
2 computer readable code means for blurring the first and second images from the
3 thresholding.

1 25. The computer program product of claim 23, further comprising
2 computer readable code means for increasing the resolution of the registered first and
3 second images from the registering.

1 26. The computer program product of claim 1, wherein (b) further
2 comprises computer readable code means for choosing N automatically by computing
3 a histogram of pixel intensities and setting the threshold for which N percent are over
4 the threshold for a predetermined value of N.

1 27. The computer program product of claim 1, wherein (c) comprises
2 computer readable code means for reducing the resolution of each of the first and
3 second images from the previous step by a factor used to partition each of the first and
4 second images from the previous step into square blocks of pixels and replacing each
5 square with the sum of the pixel values.

1 28. The computer program product of claim 1, wherein (d) comprises
2 computer readable code means for using a normalized correlation as a criteria for
3 registering the first and second images from the previous step.